



General

Guideline Title

Amblyopia.

Bibliographic Source(s)

American Academy of Ophthalmology Pediatric Ophthalmology/Strabismus Panel. Amblyopia. San Francisco (CA): American Academy of Ophthalmology; 2012. 39 p. [176 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: American Academy of Ophthalmology Pediatric Ophthalmology/Strabismus Panel. Amblyopia. San Francisco (CA): American Academy of Ophthalmology; 2007. 28 p.

All Preferred Practice Patterns are reviewed by their parent panel annually or earlier if developments warrant and updated accordingly. To ensure that all Preferred Practice Patterns are current, each is valid for 5 years from the "approved by" date unless superseded by a revision.

Recommendations

Major Recommendations

Note from the National Guideline Clearinghouse (NGC): A full description of the Care Process is provided in the original guideline document.

Ratings of the strength of the recommendations (Strong, Discretionary) and quality of evidence (Good, Moderate, Insufficient) are defined at the end of the "Major Recommendations" field.

Diagnosis

Visual Acuity

The choice and arrangement of optotypes (letters, numbers, symbols) on an eye chart can significantly affect the visual acuity score obtained. Preferred optotypes are standardized and validated. (*Strong recommendation, Good evidence*)

Vision testing with single optotypes is likely to overestimate visual acuity in a patient with amblyopia. A more accurate assessment of monocular visual acuity is obtained with the presentation of a line of optotypes or a single optotype with crowding bars that surround (or crowd) the optotype being identified. (*Strong recommendation, Good evidence*)

See Table 1 in the original guideline document for diagnostic criteria for amblyopia.

Management

Table. Guidelines for Refractive Correction in Infants and Young Children

Condition	Refractive Errors (Diopters)		
	Age <1 Year	Age 1–2 Years	Age 2–3 Years
Isoametropia (similar refractive error in both eyes)			
Myopia	–5.00 or more	–4.00 or more	–3.00 or more
Hyperopia (no manifest deviation)	+6.00 or more	+5.00 or more	+4.50 or more
Hyperopia with esotropia	+2.50 or more	+2.00 or more	+1.50 or more
Astigmatism	3.00 or more	2.50 or more	2.00 or more
Anisometropia (without strabismus)*			
Myopia	–4.00 or more	–3.00 or more	–3.00 or more
Hyperopia	+2.50 or more	+2.00 or more	+1.50 or more
Astigmatism	2.50 or more	2.00 or more	2.00 or more

Note: These values were generated by consensus and are based solely on professional experience and clinical impressions because there are no scientifically rigorous published data for guidance. The exact values are unknown and may differ among age groups; they are presented as general guidelines that should be tailored to the individual child. Specific guidelines for older children are not provided because refractive correction is determined by the severity of the refractive error, visual acuity, and visual symptoms.

*Threshold for correction of anisometropia should be lower if the child has strabismus. The values represent the minimum difference in the magnitude of refractive error between eyes that would prompt refractive correction.

Optical Correction

Treatment of refractive error alone can improve visual acuity in children who have untreated anisometropic and strabismic amblyopia. Visual acuity of children who have bilateral refractive amblyopia also can substantially improve with refractive correction alone. (*Strong recommendation, Good evidence*)

Patching

Patching may be effective in older children and teenagers particularly if they have not previously been treated. (*Good evidence*)

Most children who have moderate amblyopia respond to initial treatment consisting of at least 2 hours of daily patching or weekend atropine. (*Strong recommendation, Good evidence for treatment of amblyopia*), (*Discretionary recommendation, Good evidence for dosage [amount of time] of treatment*)

Follow-up Evaluation

Table. Recommendations for Adjusting Dosage in Amblyopia

Indication to Change	Treatment
Visual acuity is not improved after one or two treatment intervals	Maintain or increase patching or penalization, or consider alternative therapy
Severe skin irritation develops with patching	Select alternative therapy
Visual acuity is not improved with high percentage occlusion for three follow-up intervals	Taper or terminate treatment
Treatment is futile (e.g., organic lesion)	Taper or terminate treatment

Strabismus and/or diplopia develop	Temporarily stop treatment and monitor
Indication to Change	Treatment
Visual acuity decreases in the fellow eye	Temporarily stop treatment, review diagnosis, and monitor
Visual acuity is stabilized at normal or near normal for child <12 years old	Taper therapy

Note: These recommendations are generated by consensus based on professional experience and clinical impressions.

Children who have amblyopia require continued monitoring, because about one-fourth of children successfully treated for amblyopia experience a recurrence within the first year after treatment has been discontinued. (*Strong recommendation, Good evidence*)

Socioeconomic Considerations

Successful amblyopia treatment may have its greatest impact in later life, when fellow eyes can be injured or affected by diseases of the macula or optic nerve. (*Insufficient evidence*)

Definitions:

Strength of Recommendation

Strong recommendation Used when the desirable effects of an intervention clearly outweigh the undesirable effects or clearly do not

Discretionary recommendation Used when the trade-offs are less certain—either because of low-quality evidence or because evidence suggests that desirable and undesirable effects are closely balanced

Body of Evidence Quality Ratings

Good quality - Further research is very unlikely to change confidence in the estimate of effect.

Moderate quality - Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.

Insufficient quality - Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate; any estimate of effect is very uncertain.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Amblyopia including:

- Amblyopia, unspecified
- Strabismic amblyopia (suppression)
- Deprivation amblyopia
- Refractive amblyopia, including anisometropic and isoametropic amblyopia

Guideline Category

Diagnosis

Evaluation

Management

Treatment

Clinical Specialty

Family Practice

Ophthalmology

Pediatrics

Intended Users

Health Plans

Physicians

Guideline Objective(s)

To manage impairment caused by amblyopia while addressing the following goals:

- Identify children at risk for amblyopia
- Examine and diagnose the child with amblyopia or risk factors for amblyopia at the earliest possible stage
- Inform the patient and/or family/caregiver, as appropriate, and primary care provider of the diagnosis, treatment options, care plan, and prognosis
- Treat infants and children who have amblyopia in order to improve visual function and reduce the likelihood of vision-related disability
- Re-evaluate the child and adjust the treatment plan as necessary

Target Population

Children with amblyopia or who are at risk for amblyopia

Interventions and Practices Considered

Risk Assessment/Evaluation/Diagnosis

1. Comprehensive ophthalmic evaluation with attention to risk factors
2. History
3. Eye examination:
 - Binocular red reflex (Brückner) test
 - Binocularity/stereoacuity testing
 - Assessment of fixation pattern and visual acuity
 - Binocular alignment and ocular motility
 - Pupillary examination
 - External examination
 - Anterior segment examination
 - Cycloplegic retinoscopy/refraction with subjective refinement when indicated
 - Funduscopy examination
4. Criteria for diagnosis: detection of a visual acuity deficit (see Table 1 in the original guideline document) and identification of the likely cause.

Prevention/Management/Treatment

1. Annual vision screening
2. Choice of therapy:
 - Optical correction

- Patching
 - Pharmacological penalization
 - Optical penalization
 - Bangerter filters
 - Surgery to treat the cause of the amblyopia
 - Acupuncture
 - Vision therapy
3. Follow-up evaluation
 4. Counseling and referral

Major Outcomes Considered

- Visual acuity of the amblyopic eye
- Side effects or complications of treatment of amblyopia
- Visual acuity in the fellow eye

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature searches to update the Preferred Practice Pattern were undertaken in March 2011 in PubMed and the Cochrane Library and were updated in March 2012. Complete details of the literature search are available from the [American Academy of Ophthalmology Web site](#)

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Levels of Evidence to Rate Individual Studies

I++ High-quality meta-analyses, systematic reviews of randomized controlled trials (RCTs), or RCTs with a very low risk of bias

I+ Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias

I- Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias

II++ High-quality systematic reviews of case-control or cohort studies

High-quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal

II+ Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal

II- Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal

III Nonanalytic studies (e.g., case reports, case series)

Body of Evidence Quality Ratings*

Good quality - Further research is very unlikely to change confidence in the estimate of effect.

Moderate quality - Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.

Insufficient quality - Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate; any estimate of effect is very uncertain.

*Defined by Grading of Recommendations Assessment, Development and Evaluation (GRADE)

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

All studies used to form a recommendation for care are graded for strength of evidence individually, and that grade is listed with the study citation.

To rate individual studies, a scale based on Scottish Intercollegiate Guideline Network (SIGN) is used. The definitions and levels of evidence to rate individual studies are listed in the "Rating Scheme for the Strength of the Evidence" field.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The Pediatric Ophthalmology/Strabismus Preferred Practice Pattern® Panel members wrote the Amblyopia Preferred Practice Pattern® guidelines ("PPP"). The PPP Panel members discussed and reviewed successive drafts of the document, meeting in person twice and conducting other review by e-mail discussion, to develop a consensus over the final version of the document.

Rating Scheme for the Strength of the Recommendations

Key recommendations for care are defined by Grading of Recommendations Assessment, Development and Evaluation (GRADE) as follows:

Strong recommendation Used when the desirable effects of an intervention clearly outweigh the undesirable effects or clearly do not

Discretionary recommendation Used when the trade-offs are less certain—either because of low-quality evidence or because evidence suggests that desirable and undesirable effects are closely balanced

Cost Analysis

The guideline developers reviewed published cost analyses.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

The Preferred Practice Patterns Committee members reviewed and discussed the document during a meeting in March 2012. The document was edited in response to the discussion and comments.

The Amblyopia Preferred Practice Pattern (PPP) was then sent for review to additional internal and external groups and individuals in June 2012. All those returning comments were required to provide disclosure of relevant relationships with industry to have their comments considered. Members of the Pediatric Ophthalmology/Strabismus Preferred Practice Pattern Panel reviewed and discussed these comments and determined revisions to the document.

These guidelines were approved by the Board of Trustees of the American Academy of Ophthalmology (September 15, 2012).

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Timely treatment of amblyopia improves visual acuity and binocularity and decreases the likelihood of severe visual handicap if there is loss of vision in the fellow eye later in life.
- Maintenance of good vision in each eye with appropriate amblyopia treatment is an important part of successful management of strabismus.

Potential Harms

- Children treated with *patching* may develop occlusion amblyopia or strabismus in the previously better-seeing eye. Mild skin irritation from the adhesive is common with patching (41% of a treatment cohort); the irritation is moderate or severe in an additional 6%, but it can be minimized by switching to a different patch or applying skin lotions to irritated areas when the child is not wearing the patch. The parent/caregiver should be advised that children wearing a patch should be monitored carefully to avoid accidents.
- *Pharmacologic therapy* for amblyopia may have side effects that warrant consideration. Pharmacologic treatment has been associated with transient reduction of visual acuity in the nonamblyopic eye, especially when used in combination with reduced hyperopic correction. Transient reduction of visual acuity in the fellow eye is reported more often with atropine therapy compared with patching for amblyopia management.
 - *Atropine 1% solution* has been reported to cause photosensitivity in 18% of children and conjunctival irritation in 4%. Photosensitivity may limit the use of atropine in areas that have high sun exposure. Adverse systemic effects include dryness of the mouth and skin, fever, delirium, and tachycardia. Use of atropine 1% for amblyopia in children younger than 3 years has not been studied in clinical trials, and this age group may be more likely to experience toxicity.
 - Short-term side effects of *cycloplegic and dilating agents* may include hypersensitivity reactions, fever, dry mouth, rapid pulse, nausea, vomiting, flushing, and, rarely, behavioral changes.

Qualifying Statements

Qualifying Statements

- Preferred Practice Patterns (PPPs) provide guidance for the pattern of practice, not for the care of a particular individual. While they should generally meet the needs of most patients, they cannot possibly best meet the needs of all patients. Adherence to these PPPs will not ensure

a successful outcome in every situation. These practice patterns should not be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the best results. It may be necessary to approach different patients' needs in different ways. The physician must make the ultimate judgment about the propriety of the care of a particular patient in light of all of the circumstances presented by that patient. The American Academy of Ophthalmology is available to assist members in resolving ethical dilemmas that arise in the course of ophthalmic practice.

- Preferred Practice Pattern® guidelines are not medical standards to be adhered to in all individual situations. The Academy specifically disclaims any and all liability for injury or other damages of any kind, from negligence or otherwise, for any and all claims that may arise out of the use of any recommendations or other information contained herein.
- References to certain drugs, instruments, and other products are made for illustrative purposes only and are not intended to constitute an endorsement of such. Such material may include information on applications that are not considered community standard, that reflect indications not included in approved U.S. Food and Drug Administration (FDA) labeling, or that are approved for use only in restricted research settings. The FDA has stated that it is the responsibility of the physician to determine the FDA status of each drug or device he or she wishes to use, and to use them with appropriate patient consent in compliance with applicable law.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Foreign Language Translations

Patient Resources

Quick Reference Guides/Physician Guides

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1992 Feb (revised 2012)

Guideline Developer(s)

American Academy of Ophthalmology - Medical Specialty Society

Source(s) of Funding

Preferred Practice Pattern® guidelines are developed by the Academy's H. Dunbar Hoskins Jr., M.D. Center for Quality Eye Care without any external financial support. Authors and reviewers of the guidelines are volunteers and do not receive any financial compensation for their contributions to the documents.

Guideline Committee

Pediatric Ophthalmology/Strabismus Preferred Practice Pattern Panel; Preferred Practice Patterns Committee

Composition of Group That Authored the Guideline

Members of the Pediatric Ophthalmology/Strabismus Panel 2011-2012: C. Gail Summers, MD (*Chair*); Stephen P. Christiansen, MD; Alex R. Kemper, MD, MPH, MS, American Academy of Pediatrics Representative; Katherine A. Lee, MD, PhD; Graham E. Quinn, MD; Michael X. Repka, MD, MBA; David K. Wallace, MD, MPH, American Association for Pediatric Ophthalmology & Strabismus Representative; Susannah G. Rowe, MD, MPH, Methodologist

Members of the Preferred Practice Patterns Committee 2012: Christopher J. Rapuano, MD (*Chair*); David F. Chang, MD; Robert S. Feder, MD; Stephen D. McLeod, MD; Timothy W. Olsen, MD; Bruce E. Prum, Jr., MD; C. Gail Summers, MD; David C. Musch, PhD, MPH, Methodologist

Financial Disclosures/Conflicts of Interest

In compliance with the Council of Medical Specialty Societies' Code for Interactions with Companies (available at www.cmss.org/codeforinteractions.aspx) , relevant relationships with industry are listed. The Academy has Relationship with Industry Procedures to comply with the Code (available at <http://one.aaof.org/CE/PracticeGuidelines/PPP.aspx>). A majority (87%) of the members of the Pediatric Ophthalmology/Strabismus Preferred Practice Pattern Panel 2011–2012 had no financial relationship to disclose.

Pediatric Ophthalmology/Strabismus Preferred Practice Pattern Panel 2011–2012

Stephen P. Christiansen, MD: No financial relationships to disclose

Alex R. Kemper, MD, MPH, MS: No financial relationships to disclose

Katherine A. Lee, MD, PhD: No financial relationships to disclose

Graham E. Quinn, MD: No financial relationships to disclose

Michael X. Repka, MD, MBA: No financial relationships to disclose
Susannah G. Rowe, MD: No financial relationships to disclose
C. Gail Summers, MD: No financial relationships to disclose
David K. Wallace, MD, MPH: Allergan, Inc. – Consultant/Advisor

Preferred Practice Patterns Committee 2012

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Stephen D. McLeod, MD: No financial relationships to disclose
David C. Musch, PhD, MPH: No financial relationships to disclose
Timothy W. Olsen, MD: No financial relationships to disclose
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The disclosures of relevant relationships to industry of other reviewers of the document from January to August 2012 are available online at www.aao.org/ppp .

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Guideline Availability

Electronic copies: Available from the [American Academy of Ophthalmology \(AAO\) Web site](#) .

Print copies: Available from American Academy of Ophthalmology, P.O. Box 7424, San Francisco, CA 94120-7424; telephone, (415) 561-8540.

Availability of Companion Documents

The following is available:

- Amblyopia summary benchmarks for preferred practice pattern® guidelines. San Francisco (CA): American Academy of Ophthalmology; 2012 Oct. 2 p. Electronic copies: Available in English and other translations from the [American Academy of Ophthalmology \(AAO\) Web site](#) .

Print copies: Available from American Academy of Ophthalmology, P.O. Box 7424, San Francisco, CA 94120-7424; telephone, (415) 561-

Patient Resources

The following is available:

- Amblyopia: what is lazy eye? Available from the [eyeSmart Web site](#) .

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC Status

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